

# Tevatron BPM Upgrade

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CD Accelerator Coordination  
Meeting

August 3, 2004

# Outline of this talk

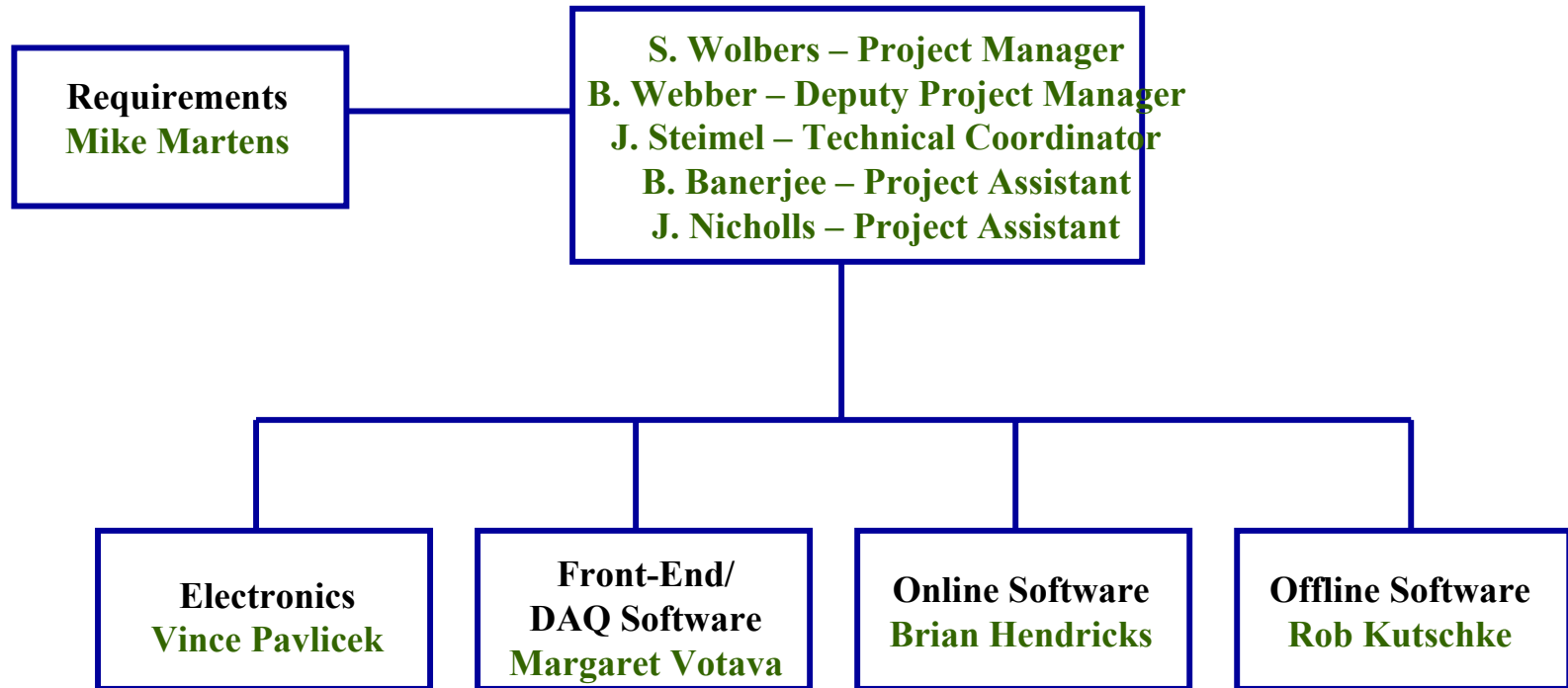
- Introduction
- Current milestones/changes in schedule
- Accomplishments and Status
- Prospects and Plans
  - Shutdown work
  - Commissioning
  - End of Project/MOU's
- Issues and concerns
- Summary

# Introduction: What is to be delivered by the TeV BPM Upgrade project?

- All new electronics.
- Front-end software.
- Data to the online/controls system.
- Applications to use the new data.
- The pickups in the accelerator will not be modified!



# **Tev BPM Upgrade Project Organization (no big changes)**



# Changes to Project since the last briefing

- BLM portion was removed. Implications:
  - The BLM will build their own interface to the controls system.
  - We can remove most of the old BPM system but must leave the BLM portion functional.
- No AIP was required to fund the project.
  - This saved us work.
- Deliveries are later than scheduled.
- New effort brought in for service building work (Tim Kasza's people) and for EchoTek understanding (Eric James, Gustavo Cancelo)
- New Task Structure from AD Project
  - One task was split into two (fabrication->H/W &S/W)
  - The rest are just re-numbered.

# Project Planning - Schedule

## DOE Milestones (1)

★ = Finished

- 9/22/03 ★ Tev BPM Requirements Review
- 12/19/03 ★ Tev BPM Technology Review
- 2/13/04 Core Electronics PO placed
  - 3/11/04 ★ EckoTek order placed
- 4/1/04 First modified board delivered
  - 6/15/04 Updated First modified board
  - - 8/9/04 Current date of 1<sup>st</sup> Mod. Board
- 4/28/04 Electronics system design review
  - 5/14/04 Design Review
  - 7/19/04 ★ Final design complete

# Project Planning - Schedule

## DOE Milestones (2)

- 6/1/04 First Production Board delivered
  - 10/7/04 First Production Board delivered
- 6/15/04 First crate in Tevatron
  - 8/23/04 Begin installation in service bldg
- 9/10/04 All Echotek boards delivered
  - No longer a milestone
- 9/29/04 System complete and cabled
  - 12/6/04 Begin commissioning (not a DOE milestone)
- 12/21/04 Commissioning complete
  - 1/12/05 Commissioning complete
- 3/31/05 Project Complete

# Project Planning - Cost

- The wbs is effort loaded and contains all M&S and SWF.
- Totals (not including overhead and contingency)
  - M&S: \$1.76 Million (Same as December 2003 estimate)
    - This is all in the AD budget.
    - We will spend almost exactly \$1.76Million so this looks fine for now.
  - SWF: \$1.3 Million <- Rising as the project time stretches
    - Combination of CD and AD effort, costed to their respective organizations.

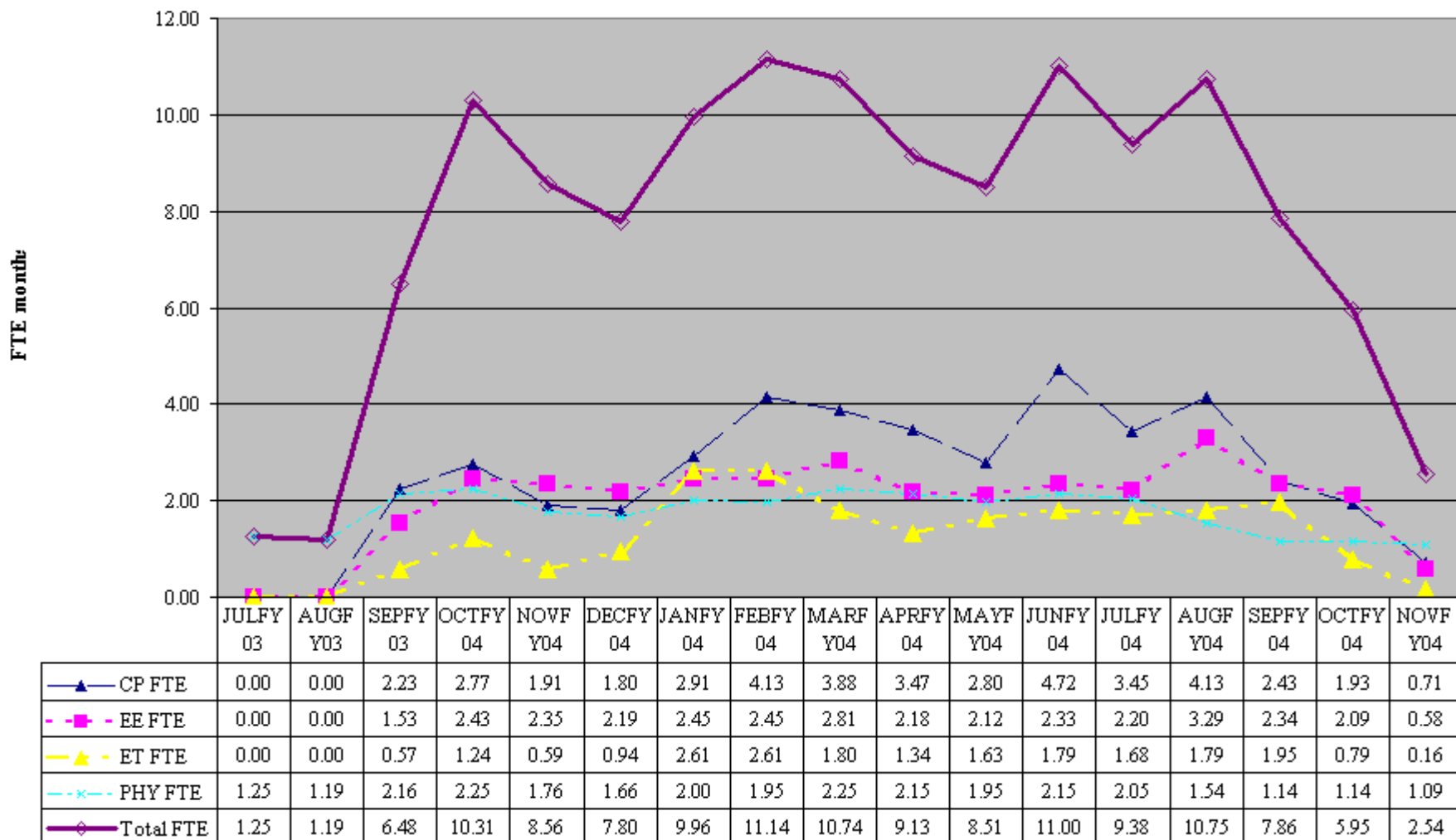


First complete wbs  
effort estimate

**NOT UPDATED!**

TBPM Estimated FTE by Group

Not synchronized with  
The commissioning plan



Effort Report:  
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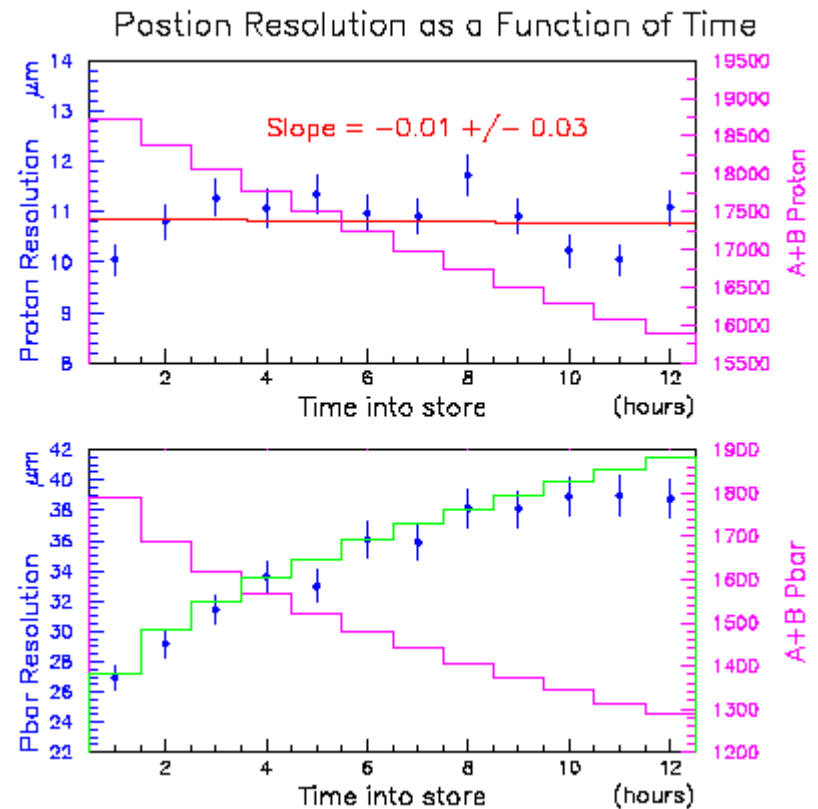
3.5 5.5 11.4 6.6 5.8 6.8 9.0 9.7 9.4 9.7 10.3

(Updated)

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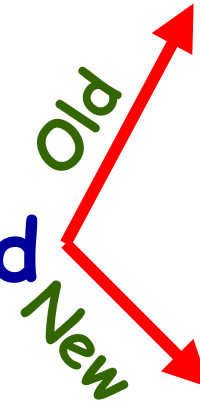
# Key Accomplishments

- Measurements/proof of concept
  - Resolutions
  - Pbar measurements
- Designs and specifications
  - Front-end, online, offline software
  - Analog front-end system
  - Timing System
  - Filters
  - Cables



# Key Accomplishments

- Prototypes/test stands
- Service Building survey and preparation
- Purchases
  - Crates, MVME Processors, analog filters, cables, timing and filter boards, etc.
  - It isn't easy spending \$1.76M

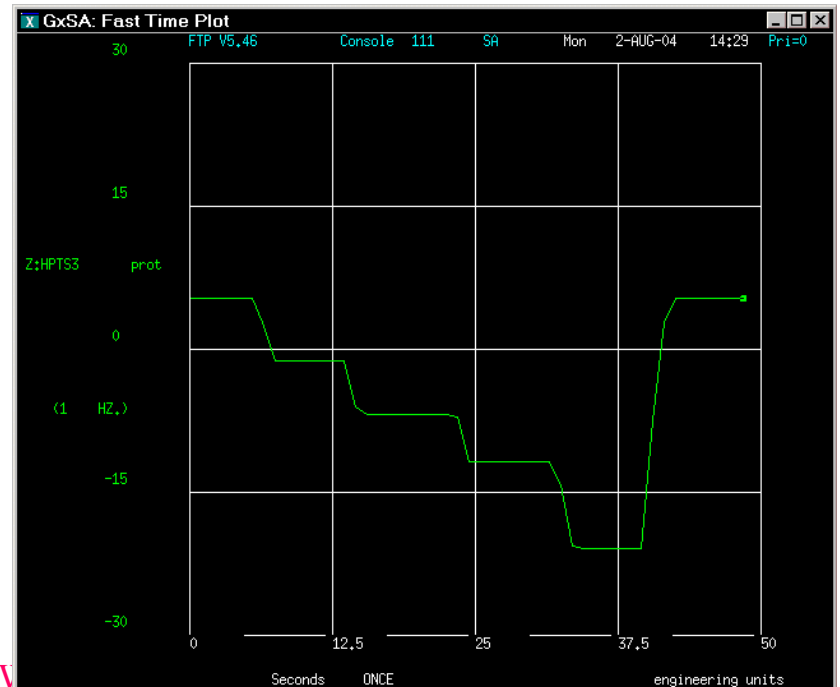
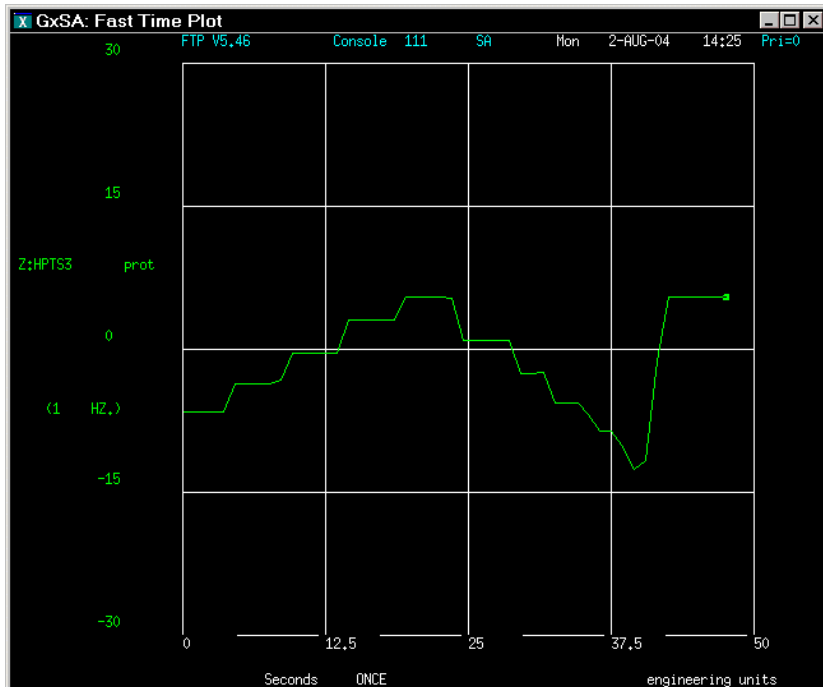


# Key Accomplishments

- Documents
  - Minutes of all meetings
  - Written documents in the AD Doc DB
    - 122 documents uploaded as of 7/28/04
    - A document is a container and often has many documents, so 122 is a lower bound.
  - Specifications, designs, schematics, implementation plans.
  - MOU's
    - Hardware (In AD and CD for review)
    - Software (Still inside TeV BPM Project)
- Web pages

# Key Accomplishments

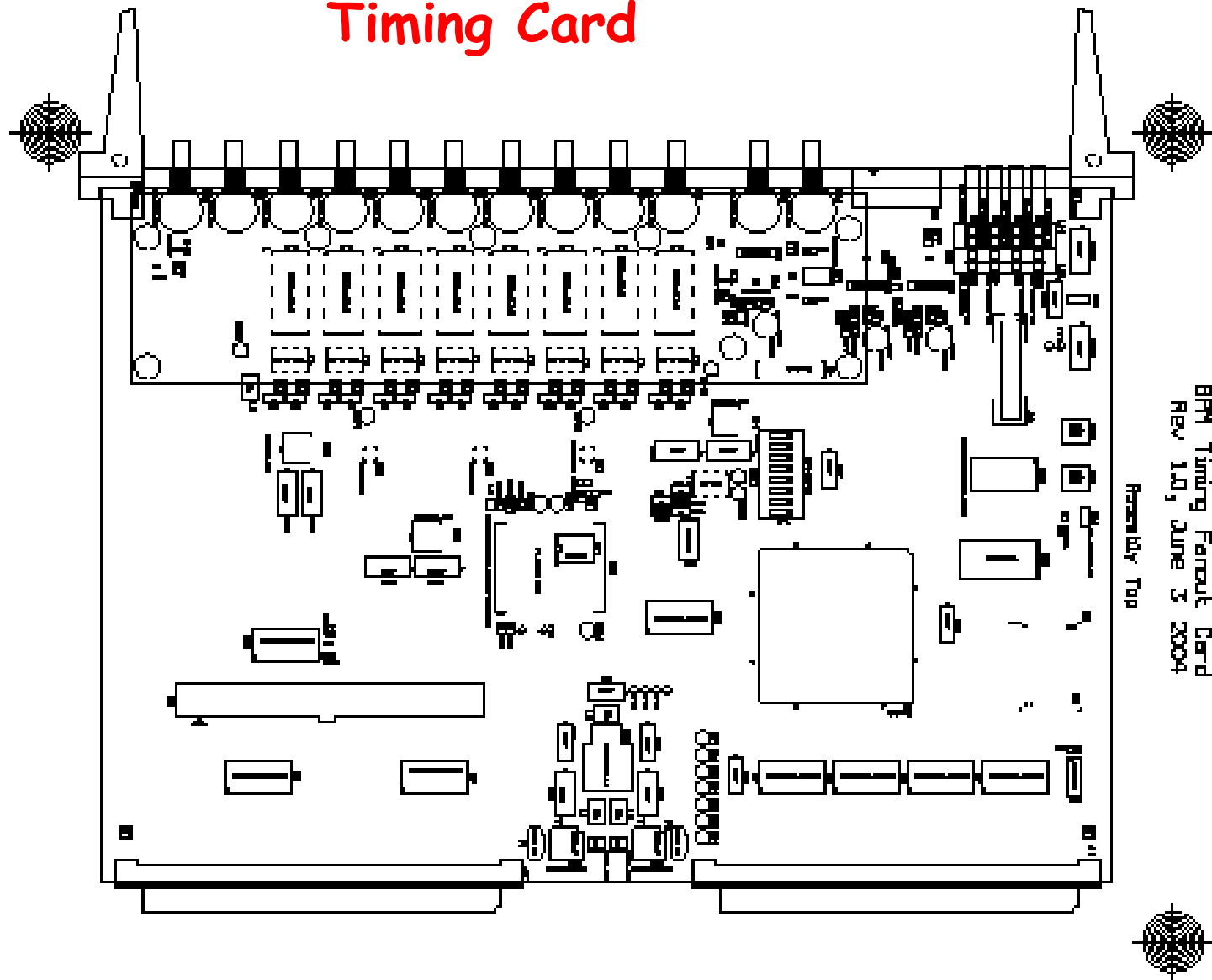
- The best of all - so far.
  - Position measurements on the teststand using new H/W and S/W.



# Hardware modules

- Timing Board prototypes
- Filter Board prototypes
- EchoTek boards
  - Modified with VME interface, memory and FPGA changes
  - Still waiting for second version

# Timing Card



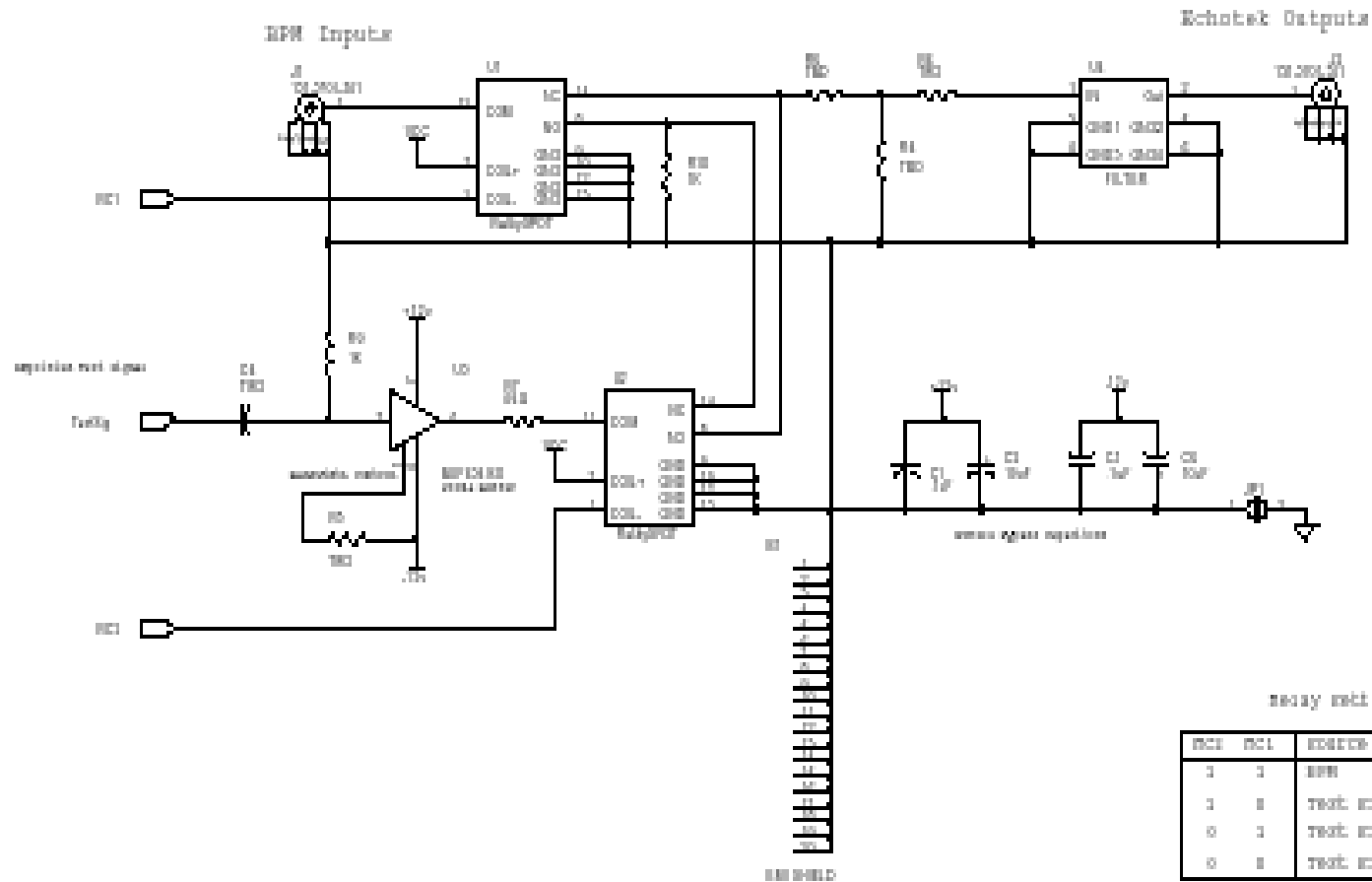
# Timing Card



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# Filter Board

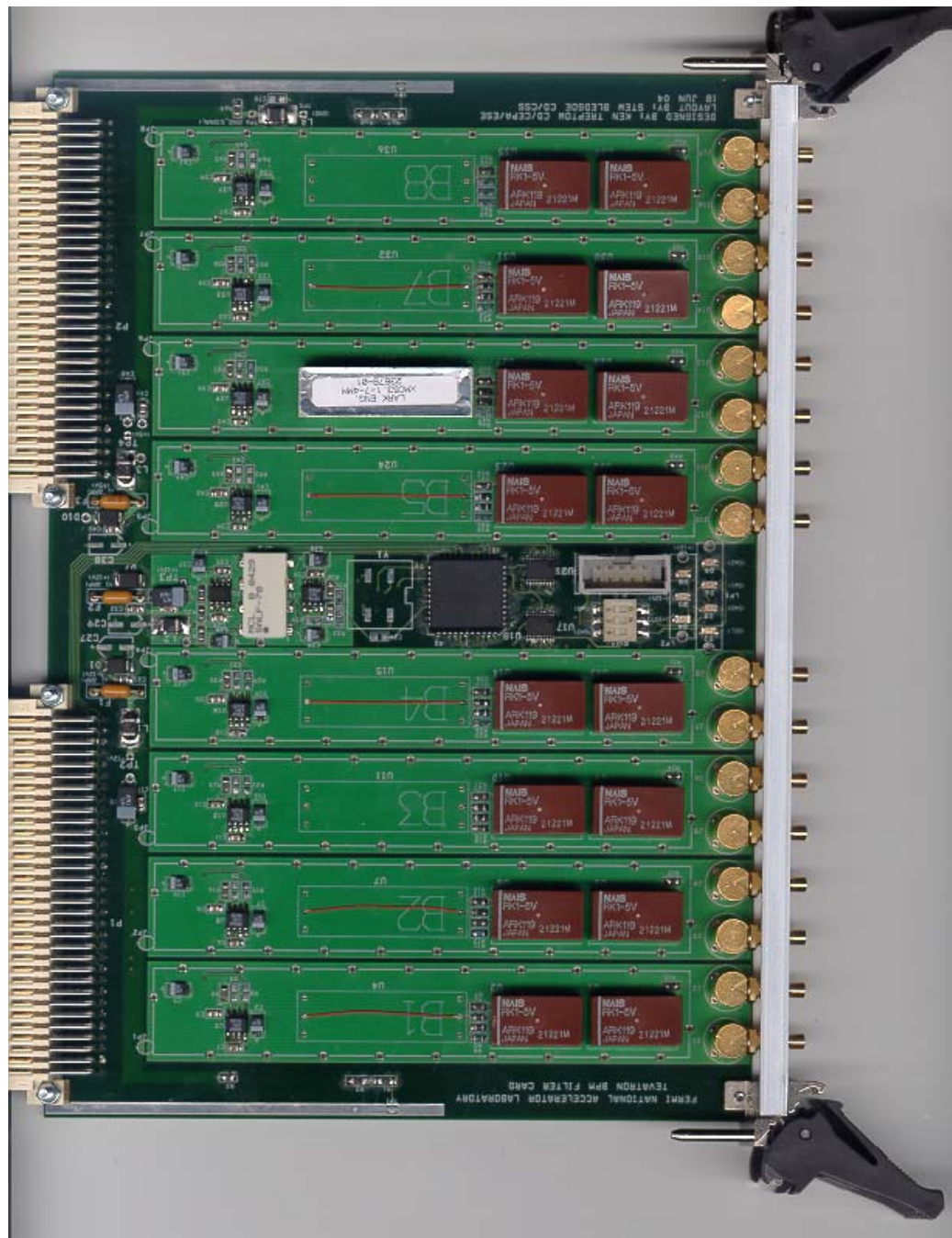


array settings table

MC1	MC1	source	destination
1	1	BPM	Schotek
1	8	test signal	BPM
0	1	test signal	BPM & Schotek
0	8	test signal	Schotek

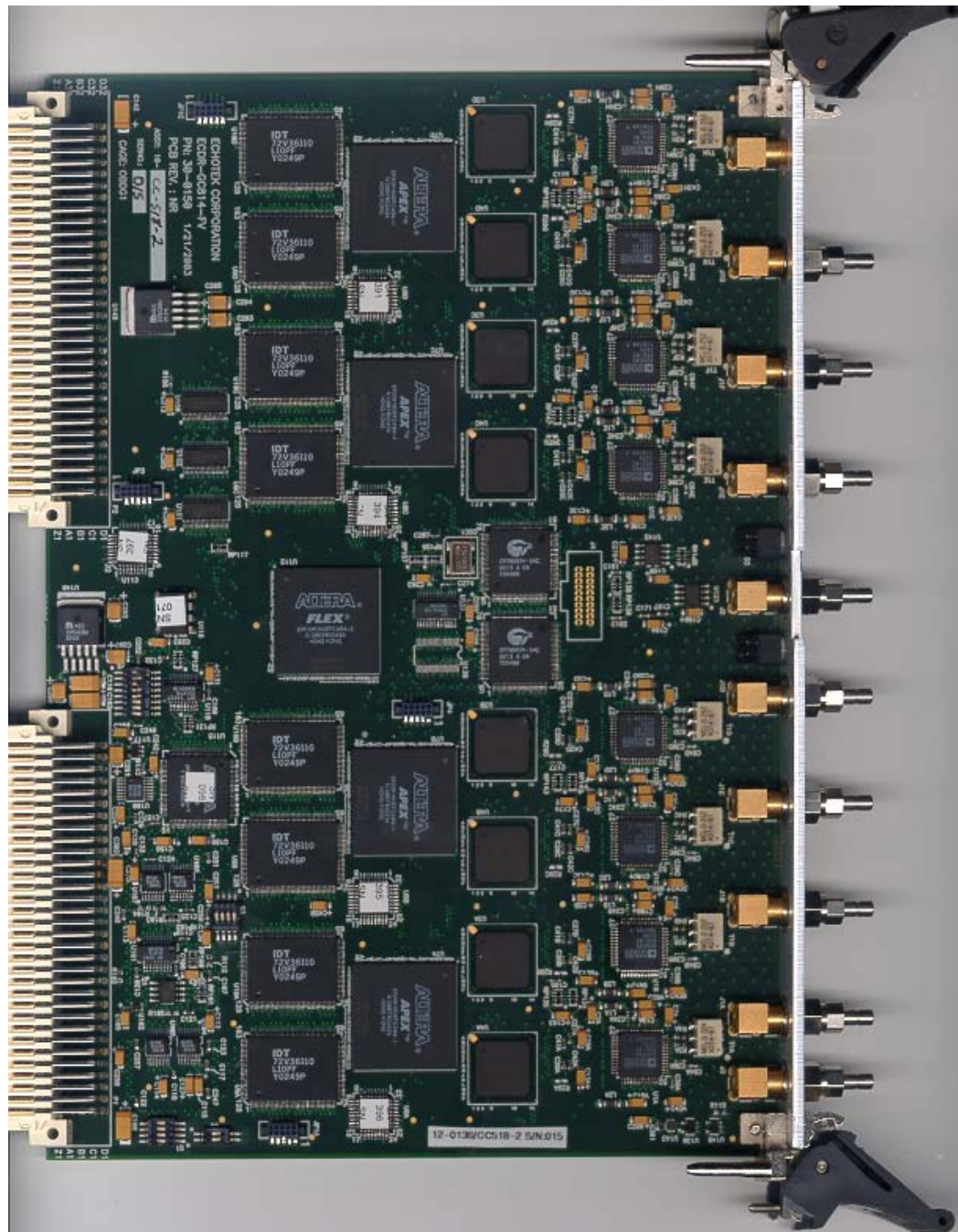
notes: array is energized when MC1:0 default state is MC1:1, MC1:1 tripping reset once sends a 1 to the array driver to energize a array.

# Filter Board



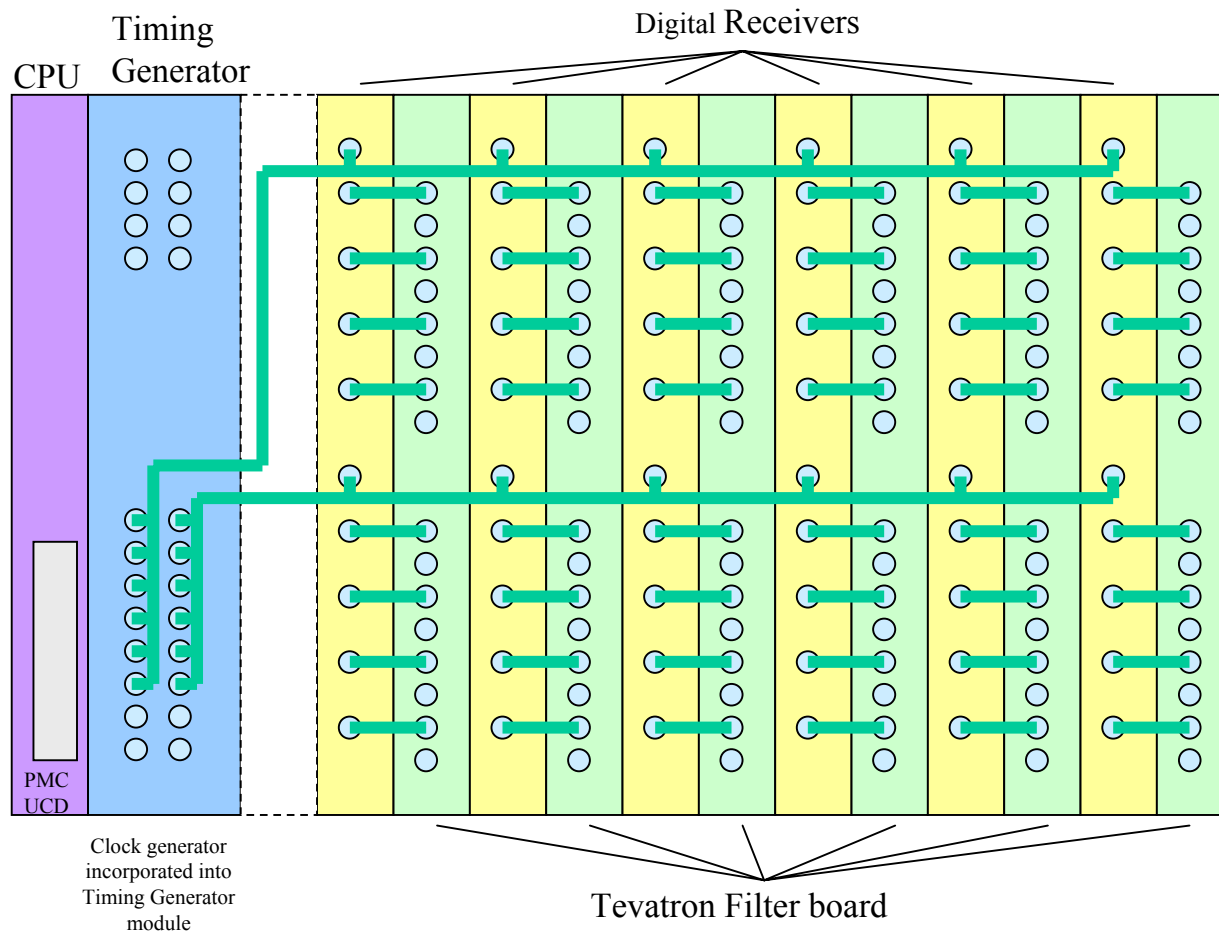
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# EchoTek Board



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# Final Crate Configuration - Front Panel





## Old Test Stand (From February)

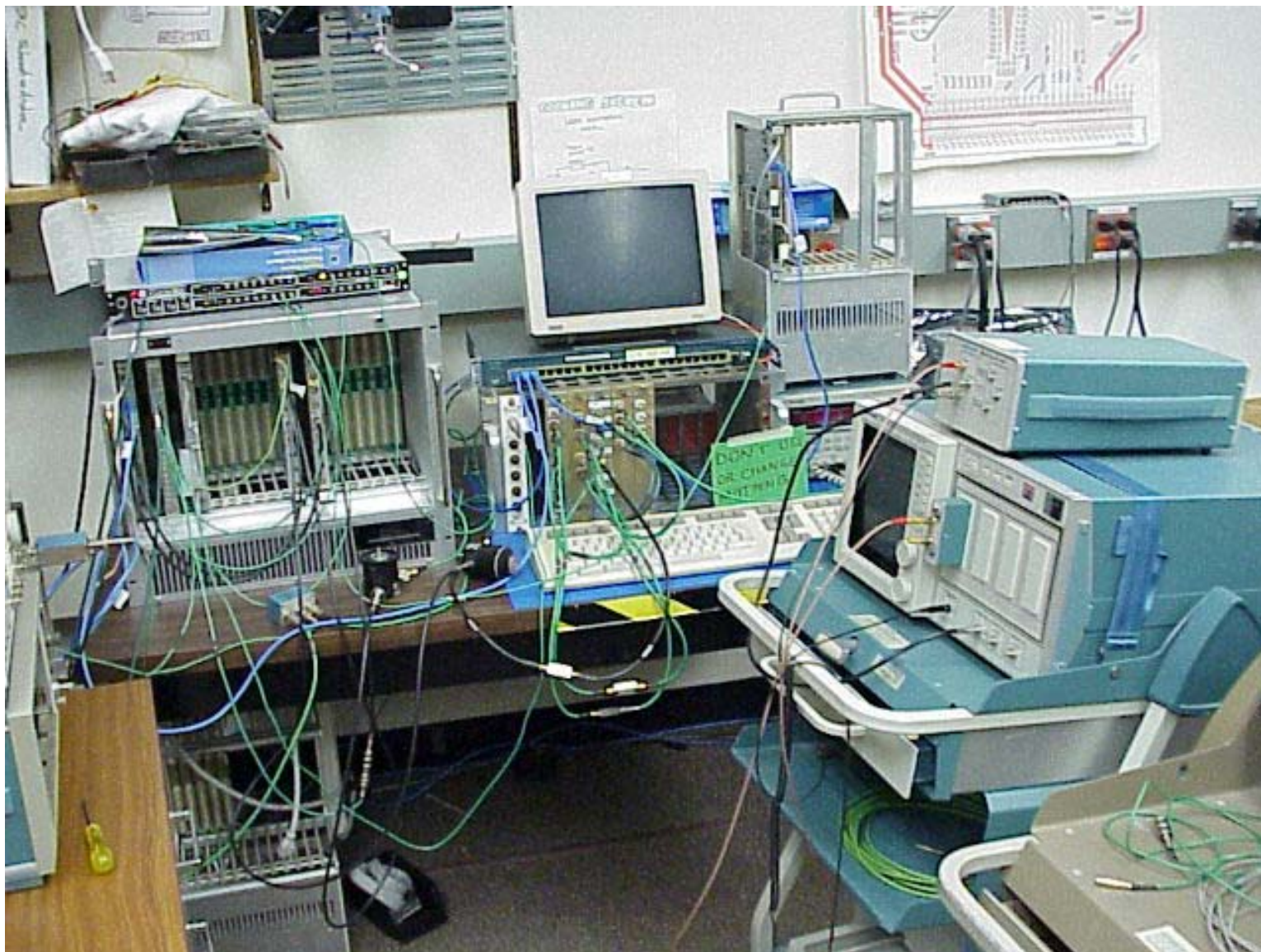


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# Test Stand in July, 2004 - FCC3



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# Dawn VME Crate



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## Status

- Integrating H/W and S/W on the FCC3 teststand.
- Installing second teststand in the accelerator (A3) this week.
- Will make measurements (closed orbit first) with the beam.
- Test of end-to-end system (pickups - filter - EchoTek - FE - online - controls)
- This will be a major accomplishment!



# Prospects and Plans

- Shutdown

- Plan to install most of the 27 crates during the shutdown.
- There is space in the racks.
- We will have the VME crates and MVME processors.
- Some concern about the remaining items.

# Prospects and Plans

- **Commissioning**

- The system will be commissioned house by house after the beam returns in December, 2004.
- Can't commission during the shutdown- the accelerator needs the old BPM system to bring up the beam.
- Can do some installation in parallel with the commissioning.

# Prospects and Plans

- End of Project:
  - Need to commission the whole system
  - Diagnostics and calibrations need to be developed and documented.
  - The system needs to be documented and handed over to operations.
  - MOU's
    - Hardware
    - Software

# Issues

- Most Issues and concerns mentioned in February have been dealt with or have gone away by magic.
- Some expertise needed in the project, but we are making progress on many fronts.
- Much work to do! Integration and commissioning will bring many surprises.

# Issues

- **MI BPM**
  - MI BPM is another large BPM system.
  - Discussions of CD contributions have occurred off and on during the past 6-12 months.
  - No commitments at this time that I know of.
  - I am sure we will all hear more in the near future.

# Summary

- The Tevatron BPM Upgrade is moving forward thanks to the hard and dedicated work of many people in CD and AD.
- We are reaching an exciting part of the project where we integrate and commission the system.
- The plan is to finish in early 2005.